

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
25 November 2004 (25.11.2004)

PCT

(10) International Publication Number
WO 2004/102712 A3

(51) International Patent Classification⁷: **H01M 8/02**
(21) International Application Number:
PCT/JP2004/006090

(22) International Filing Date: 27 April 2004 (27.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2003-138652 16 May 2003 (16.05.2003) JP

(71) Applicant (for all designated States except US): **TOYOTA JIDOSHA KABUSHIKI KAISHA** [JP/JP]; 1, Toyota-cho, Toyota-shi, Aichi 4718571 (JP).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **OHNUMA, Satoshi** [JP/JP]; c/o TOYOTA JIDOSHA KABUSHIKI KAISHA, 1, Toyota-cho, Toyota-shi, Aichi 4718571 (JP).

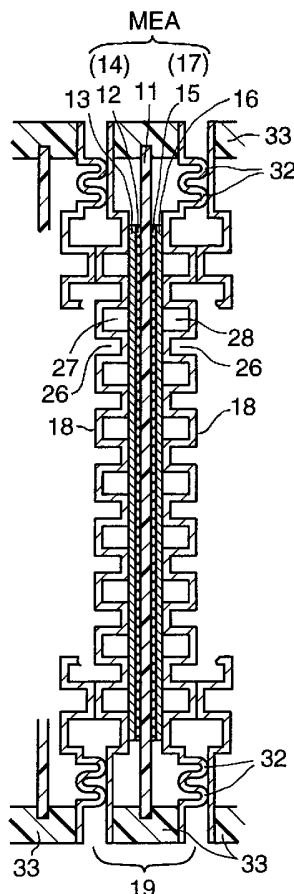
(74) Agent: **TABUCHI, Tsuneo**; Room 1002, Hosokawa Bldg., 1-17, Akasaka 1-chome, Minato-ku, Tokyo 1070052 (JP).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,

[Continued on next page]

(54) Title: FUEL CELL



(57) Abstract: A metal separator defines a fluid passage. The fluid passage defines a reactant gas passage formed at a first, MEA-opposing surface of the metal separator, a coolant passage formed at a second, opposite surface of the metal separator, a reactant gas manifold fluidly connected to the reactant gas passage and a coolant manifold fluidly connected to the coolant passage. The metal separator includes a rib formed thereon so as to surround a portion of the metal separator where the fluid passage is formed. The rib is adapted to contact a metal separator of an adjacent fuel cell to construct a seal for a fluid passage surrounded by the rib. A plurality of seal lines where each seal line includes each rib may be provided. By virtue of the presence of the rib, a gasket provided in a fuel cell of comparison does not need to be provided.



SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE,*

- *of inventorship (Rule 4.17(iv)) for US only*

Published:

- *with international search report*

(88) Date of publication of the international search report:

17 February 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No

/JP2004/006090

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01M8/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 02, 5 February 2003 (2003-02-05) & JP 2002 289223 A (AISIN SEIKI CO LTD), 4 October 2002 (2002-10-04) cited in the application abstract	1-11
A	DE 100 15 360 A (DORNIER GMBH) 11 October 2001 (2001-10-11) figures 2,3	1-11
A	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 02, 26 February 1999 (1999-02-26) & JP 10 308227 A (FUJI ELECTRIC CO LTD), 17 November 1998 (1998-11-17) abstract	1-11
	----- -/--	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

5 November 2004

Date of mailing of the international search report

17/11/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Jourdan, A

INTERNATIONAL SEARCH REPORT

tional Application No

JP2004/006090

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002/086196 A1 (OHTANI TERUYUKI ET AL) 4 July 2002 (2002-07-04) figures 1-4 -----	1-11
A	US 6 045 934 A (ENAMI YOSHIKI) 4 April 2000 (2000-04-04) column 4, lines 33-45; figure 3 -----	1-11
A	EP 1 286 404 A (EQUOS RES KK) 26 February 2003 (2003-02-26) the whole document -----	1-11

INTERNATIONAL SEARCH REPORT

Information on patent family members

tional Application No

/JP2004/006090

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2002289223 A	04-10-2002	NONE	
DE 10015360 A	11-10-2001	DE 10015360 A1	11-10-2001
JP 10308227 A	17-11-1998	NONE	
US 2002086196 A1	04-07-2002	JP 3569491 B2 JP 2002175818 A	22-09-2004 21-06-2002
US 6045934 A	04-04-2000	JP 3077618 B2 JP 10247505 A DE 19809575 A1	14-08-2000 14-09-1998 10-09-1998
EP 1286404 A	26-02-2003	JP 2003197217 A EP 1286404 A2 JP 2003272666 A US 2003039875 A1	11-07-2003 26-02-2003 26-09-2003 27-02-2003